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SKELETAL MATERIAL FROM SAN JOSÉ RUIN BRITISH HONDURAS

BY

WILFRID D. HAMBLY

CURATOR, AFRICAN ETHNOLOGY

FIELD MUSEUM–CARNEGIE INSTITUTION EXPEDITIONS TO BRITISH HONDURAS

3 Text Figures

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INTRODUCTION

The total amount of skeletal material recovered from Maya sites in British Honduras is small in relation to the archaeological output as a whole, and owing to the humidity of the soil the bones recovered are often friable and imperfect. Therefore, a careful examination of even the fragmentary evidence from each site is desirable in order that a complete anatomical description of the Mayan type may eventually be prepared by aggregation of data.

I am greatly indebted to Dr. Gerhardt von Bonin for suggestions and criticism.

The following account is concerned with:

I. Description and measurement of skulls, jaws, and long bones excavated by J. Eric Thompson at San José (Field Museum–Carnegie Institution Expeditions, 1931 and 1934). The measurements made, including cranial capacities, are given in Tables I–IV.

II. Comparative study of skull measurements with head measurements on the living Maya of Yucatan, and comparison of the skeletal material from San José with that from Baking Pot.

I. SKULLS AND CALVARIA

General Observations.—Study of head form is based on the evidence afforded by three skulls and three calvaria, each of which yielded some reliable measurements (Tables I–IV), though in only two instances (Nos. 189703 and 189198) were numerous measurements possible.

No. 189727 (Burial C8). This calvarium is small, of rounded form, and the bones are thin. All sutures are open. Two wormian bones are present, one at each side of lambda. Reconstruction, combined with slight occipital flattening (probably ante-mortem), has led to some distortion, but this is not so great as to invalidate all anthropometric measurements. The supraorbital region is level, the temporal crest is feebly developed, the frontal region is smooth, and the mastoids are small. The calvarium is that of a child having a cranial capacity of about 1,128 cc. and a cephalic index of 91. The burial belongs to the San José IV or V phases.

No. 189562 (Burial B19), Figs. 1–3. The strongly developed occipital protuberances and the size of the mastoids, together with the development of the glabella and supraorbital ridges, are male characteristics. The occipital region is slightly flattened but it is doubtful whether this is artificial deformation. All sutures are partially synostosed. The lambdoid suture is complexly serrated, and despite considerable synostosis there is evidence of many intercalated bones. The mandible gives evidence of senility, since there was ante-mortem loss of all the teeth and absorption of the alveolar border. This absorption has of course resulted in a reduction of the height of the symphysis and the body of the jaw, so that measurements are of little value. The ramus forms a wide angle, and considerable protrusion of menton is noticeable. The burial probably belongs to the San José V phase.

No. 189703 (Burial B23), Figs. 1–3. The characters are those of a male. The general form is less rounded than in other specimens. All the sutures are synostosed to some extent, and the coronal suture shows almost complete obliteration. Considerable ante-mortem loss of the teeth has taken place from the maxilla. The missing teeth are all the molars and premolars on the right side; also the second bicuspid, and the first and second left molars. There are signs of caries and much wear of the rest of the teeth. Alveolar prognathism is pronounced. In the mandible the only remaining teeth are the third right molar, which is much worn, the first right premolar, the right canine, and the right lateral incisor. The majority of the losses are ante-mortem, since complete absorption of the alveolar border has taken place. The burial probably belongs to the San José IV phase.

In this instance the total facial index can be estimated by taking

$$\frac{\text{menton-nasion height} \times 100}{\text{diameter, bizygomatic maximum}} = \frac{106 \times 100}{134} = 79.1.$$

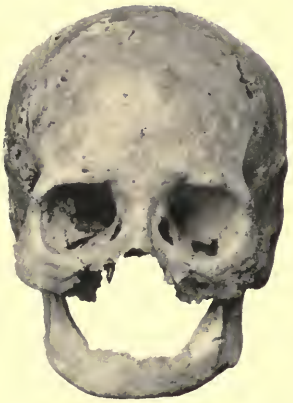
The upper facial index may also be calculated from the formula

$$\frac{\text{alveolar point-nasion height} \times 100}{\text{diameter, bizygomatic maximum}} = \frac{72 \times 100}{134} = 53.7.$$

The observations of M. Steggerda (Anthropometry of Adult Maya Indians. Carnegie Institution, Washington, 1932, p. 80) on fifty living males showed that a total facial index of 78–82 occurred with the greatest frequency and the mean was 82.46 ± 0.37, to which our figure of 79.1 is a close approximation.

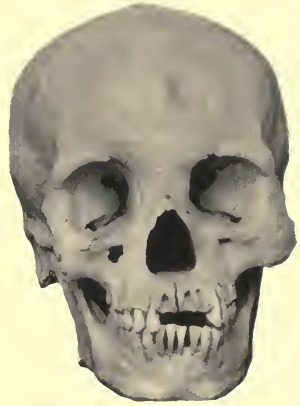
No. 189562 No. 189703 No. 189198

FIG. 1. Skulls from San José, British Honduras. Side view.



No. 189562

No. 189703



No. 189198

FIG. 2. Skulls from San José, British Honduras. Front view.

No. 189198 (Burial B31), Figs. 1–3. This is apparently the skull of a young male, with supraorbital ridges, glabella, mastoids, and zygomatic arches well developed. All of the sutures are open. The occipital region is slightly flattened. The left frontal eminence shows a circular depressed fracture which has healed. The body of the jaw and the two rami are well developed, with strong lines of muscular attachment. The sigmoid notches are deeper than in other examples. The gonial angles are slightly everted. All the teeth of the mandible are present and in perfect condition, without signs of caries or wear. There has been post-mortem loss of the third right molar and three incisors from the maxilla.

This is the only skull that gives the measurements necessary for calculating the dental index. The molars and premolars of the maxilla measure 42 mm., and the basi-nasal length is 93 mm. The dental index is 45.2, which, according to Flower (quoted by Hrdlicka, Anthropometry, 1920, p. 143), brings the specimen just within the macrodont class. The burial probably belongs to the San José V phase.

No. 189165 (Burial B29). This specimen is the calvarium of an aged male. The frontal and sagittal sutures are completely synostosed. The squamous and lambdoid sutures are almost occluded. The length (147 mm.) and the breadth (140 mm.) are doubtful, owing to what appears to be ante-mortem flattening of the occiput, and some distortion due to repair work. The cephalic index of 95.2 is, however, within the range of observations made by O. Ricketson, Jr. The burial belongs to the San José IV phase.

No. 189145 (Burial B32). A calvarium with considerable occipital flattening. The cephalic index of 91.0 (Table I) is, however, within the range for crania (Ricketson), and for heads of living Maya males (M. Steggerda, Excavations at Baking Pot, British Honduras. Carnegie Institution, Washington, Pub. No. 403, 1931, Table I, p. 26). The burial perhaps belongs to the San José III phase.

No. 189093 (Burial A4). Left half of a calvarium with large mastoid and prominent supraorbital ridge. Very pronounced occipital protuberance. There is partial synostosis of the coronal and sagittal sutures. The length of 183 mm. is so far in excess of other length measurements (Table I) that this specimen must be regarded as an aberrant form. It may be significant that associated artifacts represent imported or rare forms. The individual was clearly a person of importance. The burial belongs to the San José V phase.

No. 189562

No. 189703

No. 189198

FIG. 3. Skulls from San José, British Honduras. Top view.

II. JAWS AND TEETH

(*Table II*)

Mandibles associated with skulls have already been described.

No. 189163 (Burial B27) is a strong mandible with complete dentition except for post-mortem loss of the third left molar. The right condyle and the right coracoid process are missing. Some abrasion of the teeth is noticeable, especially on the crowns and the buccal surfaces of the first and second left molars. The mental protuberance, mental tubercles, and incisor fossae are very clearly defined. The genial tubercles are prominent. The internal oblique line of the jaw is strongly marked. The burial belongs to the San José V phase.

No. 189079 (Burial B30) is a mandible with a strong mental protuberance. The left condyle and the left coracoid process are missing. The dentition is complete except for one broken incisor. Crowding of the incisors has displaced two central incisors, which are 4 mm. above the level of the lateral incisors. The prominence has caused abrasion of the central incisors, and the wear is noticeably in excess of that shown by the other teeth. Pyorrhea around the incisors and in some of the posterior teeth has caused recession of the alveolar border. The burial can be assigned to the San José IV phase.

No. 189544 (B15) is a fragmentary jaw showing the molars to be much more abraded on the right side than on the left. The teeth are worn chiefly on their buccal surfaces. The burial belongs to the San José V phase.

No. 189551 (Burial B7). The slight development of muscular attachments suggests the jaw of a female, and the whole mandible is of slender construction in comparison with a typical male jaw (189198). There is a full dentition without caries or abrasions. The right coracoid process and the left and right condyles are slightly damaged. The burial belongs to the San José V phase.

No. 189695 (Burial B20). This mandible has a strong symphysis, but the lines of muscular attachment are not well defined in comparison with those of a typical male mandible. The condyles are absent. Dentition is complete and regular, showing no caries or wear. The evidence of sex is, however, somewhat equivocal, since the muscular attachments were weak, but the teeth are even larger than those of a typical male jaw (189198). The burial belongs to the San José IV phase.

No. 189730 (Burial B24). This mandible has the permanent first molar and the deciduous second molar on each side of the jaw. The unerupted permanent second molars are visible in their sacs. One deciduous first molar (right side) is carious. The second bicuspid (left) can be seen in its sac. The deciduous canine is present. The right and left lateral incisors are in their sacs. The right central incisor is not fully erupted. The left central incisor is missing (post-mortem). The probable age of the child was from six to seven years. The burial belongs to the San José IV phase or, possibly, to the San José V phase.

III. LONG BONES

The skull associated with these fragmentary long bones was diagnosed as that of an aged male (Table I). Portions of the femora show a well-defined linea aspera and moderate platymery (platymeric index, R 70, L 67.7). The popliteal surfaces of the femora are concave. The tibiae are somewhat platycnemic (platycnemic index, R 66.7, L 63.3). Measurements were taken at the height of the foramen nutricium.

The undamaged bones are a right fibula, 325 mm.; a left ulna, 245 mm. (maximum); and two radii, having a maximum length of 230 mm.

According to K. Pearson (On the Reconstruction of the Stature of Prehistoric Races. Phil. Trans. A., vol. 192, pp. 169–244), who worked with French and Ainu material, the extension of a stature regression formula from one race to another may be valid, but for preference each racial group should have its own specific racial regression formula. The data from Ainu, Chinese, and French, discussed by P. H. Stevenson (On Racial Differences in Stature Long Bone Regression Formulae. Biometrika, vol. 21, 1929, pp. 301–321), have somewhat modified the views of Pearson. Stevenson shows that proportions between limb length and stature change from race to race.

As is well known, regression formulae should be applied only to averages; therefore, no estimate of stature can be made from our single and incomplete set of Maya bones.

IV. CRANIAL CAPACITIES

The capacity of each skull was measured three times by packing it tightly with mustard seed. The results of the three experiments,

also the averages, are given in Table III. The figures obtained for the three tests on each skull indicate that discrepancies in the measurement of capacities can be small, provided that considerable time and care are given to packing the skull tightly, and that the seed emptied from the skull is tightly packed in the measuring glass. The bases of the skulls were intact, but, since they were somewhat frail, support was given with thin muslin pasted over the surfaces. When finding capacities of a long series of skulls, W. R. Macdonnel (A Study of the Variation and Correlation of the Human Skull, with Special Reference to the English Crania. Biometrika, vol. 3, 1904, pp. 191–244) first established a ratio between the weight of mustard seed used to fill a *crane étalon* and the water capacity of the same skull. He found that in measuring a fairly long series of skulls there was a personal equation of 10 to 15 cc. T. W. Todd (Cranial Capacity and Linear Dimensions in White and Negro. Amer. Jour. Phys. Anth., vol. 6, No. 2, 1923, pp. 98–194) came to the conclusion that for measurement of any individual skull the personal equation might be as much as 40 cc. G. von Bonin (On the Size of Man's Brain as Indicated by Skull Capacity. Jour. Comp. Neurology, vol. 59, 1934, p. 9) concluded that the personal equation in measuring the average of a series may vary from 10 to 20 cc.

The use of a regression formula for calculating skull capacity from skull measurements (the product L.B.H′ is frequently used) is of some interest. Without going into a detailed discussion we shall briefly apply three formulae: (1) K. Pearson's inter-racial formula (On the Measurement of Internal Capacity from Cranial Circumferences. Biometrika, vol. 3, 1904, pp. 366–397; and A. Lee, Reconstruction of the Internal Capacity of a Skull from External Measurements. Phil. Trans., A., vol. 126, pp. 225–264); (2) L. Isserlis' formula based on Negro material (Formulae for the Determination of the Capacity of Negro Skulls from External Measurements. Biometrika, vol. 10, 1914, pp. 188–192); (3) B. G. E. Hooke's formula (A Third Study of the English Skull with Special Reference to the Farrington Street Crania. Biometrika, vol. 18, 1926, pp. 1–55). For testing of this formula (Hooke) on skulls of various races, see G. von Bonin (On the Size of Man's Brain as Indicated by Skull Capacity. Jour. Comp. Neurology, vol. 59, No. 1, 1934, p. 12, Table I). The results of using these three formulae are given in Table III. Pearson's formula calculated by the method of least squares does not allow of estimating the probable error. For the second and third

formulae we find the following difference between observed and calculated values of cranial capacity:

	Observed means to calculated	$\Delta/P\Delta$
Isserlis	-147 ± 39.25	$-3.75-$
Hooke	$-\ 95 \pm 29.5$	-3.22

We therefore find that Pearson's general formula gives the best result, but of course no valid comparison can be drawn from data relating to only three skulls.

V. COMPARATIVE STUDY OF SKULL AND HEAD MEASUREMENTS

Table IV makes a comparison of cranial measurements from San José and Baking Pot with similar measurements recorded by M. Steggerda on living Mayas of Yucatan. Only in case of the living Mayas are the figures based on an adequate number of observations. There are very few races for which we have adequate measurements of both the living head and the skull. M. L. Tildesley (Determination of the Cranial Capacity of the Negro from Measurements of the Skull or the Living Head. Biometrika, vol. 19, 1927, pp. 204–206), T. W. Todd (Cranial Capacity and Lineal Dimensions in White and Negro. Amer. Jour. Phys. Anth., vol. 6, No. 2, 1923, pp. 158–160), and F. Sarasin (Anthropologie der Neu-Caledonier und Loyalty-Insulaner. Berlin, 1916–22) have contributed to this subject. Probably Sarasin's material from New Caledonia and the Loyalty Islands is the best available. His records of differences in measurement between the living head and the skull are given below.

		Length	Breadth
New Caledonia	♂	8.3	15.3
	♀	3.2	11.9
Loyalty Islands	♂	8.4	14.4
	♀	8.3	10.9

Disregarding the 3.2, which is in disagreement with the other data, we would conclude that the living head in both males and females is somewhat more than 8 mm. longer than the skull. The difference in breadth between living heads and skulls is about 15 mm. and 11 mm. for males and females respectively. On this basis the length of the skulls from Baking Pot and the breadth of those from San José agree well with Steggerda's measurement of the living.

Turning to a comparison of the skulls from San José and Baking Pot we find a great discrepancy in the lengths, but since the skulls are deformed the comparison can give no reliable information.

The Baking Pot skulls are broader but not pronouncedly so, nor do the cranial capacities or the minimum frontal diameters show significant differences.

It is therefore permissible to state that nothing is known that could not be explained on the simple assumption that both skeletal series belong to the same physical type, and that this is the type for whose living representatives M. Steggerda has supplied information.

TABLE I

(*Measurements in millimeters*)

Anthrop. notation	Child's calvarium No. 189727	Skull aged male adult No. 189562	Skull elderly male No. 189703	Skull young male No. 189198	Calvarium sex? No. 189145	Left half calvarium male No. 189093	Calvarium aged male No. 189165
L	145	157	167	153	154	183	147
B	132	140	137	140	140	.....	140
H′	112	137	125	132	.....	.....	.....
100 B/L	91	89.1	82	91.5	91	.....	95.2?
J	...	121	134	125	.....	.....	.....
B′	...	99	96	103	.....	.....	101.2
SC	...	22.4	26.1	27.3	26.2	.....	.....
G′H	...	.....	70.5	69.8	.....	.....	.....
GL	...	basion	109.2	.....	.....	.....	.....
LB	...	broken—no alveolar point	95.0	basion	.....	.....	.....
A∠	...		59.0°	broken	.....	.....	.....
N∠	...	.....	82.0°	.....	.....	.....	.....
B∠	...	.....	39.0°	.....	.....	.....	.....
S	...	350	345	337	.....	.....	.....
S_1	...	120	120	112	.....	.....	.....
S_2	...	136	115	118	.....	.....	.....
S_3	...	94	110	107	.....	.....	.....
S_1'	...	109	108.5	105	.....	.....	.....
S_2'	...	113.5	103.2	102	.....	.....	.....
S_3'	...	87.2	91.2	94	.....	.....	.....
GLU	...	494	508	484	.....	.....	.....
BQ′	...	336	293	316	.....	.....	.....
NH′	...	.....	52.5	55.2	.....	.....	.....
NB	...	.....	29.8	26.5	.....	.....	.....
100 NB/NH′	...	.....	56.7	48.0	.....	.....	.....
O_1R	...	40.5	38.5	39.3	.....	.....	.....
O_2R	...	38.8	35.5	38.7	.....	.....	.....
100 O_2/O_1R	...	95.8	92.3	98.5	.....	.....	.....
O_1L	...	39.8	39.5	39.8	.....	.....	.....
O_2L	...	37.2	35.5	36.0	.....	.....	.....
100 O_2/O_1L	...	95.7	90.0	90.4	.....	.....	.....
fml	...	.....	33.0	.....	.....	.....	.....
fmb	...	.....	29.1	28.1	.....	.....	.....
100 fmb/fml	...	.....	88.2	.....	.....	.....	.....
G_1	...	.....	58.2	.....	.....	.....	.....
G_2	...	.....	44.5	41.2	.....	.....	.....
100 G_2/G_1	...	.....	76.5	.....	.....	.....	.....

TABLE II

(Measurements in millimeters)

Catalogue Numbers	Mandibles						Teeth								Remarks
							Mandible				Maxilla				
							Right		Left		Right		Left		
	1	2	3	4	5	6	M	MPM	M	MPM	M	MPM	M	MPM	
189196	110.0	.....	70.5	37.0	28.0	33.3	....	....	....	....	....	....	....	....	Everted gonial angles
189079	104.0	.....	66.6	29.2	33.0	28.0	....	....	....	....	....	....	....	....	Everted gonial angles
189198	89.5	?118.0	65.5	34.3	25.0	27.8	32.0	46.0	30.8	45.0	....	....	27.6	41.5	Inverted gonial angles
189703	103.0	123.0	64.5	36.0	34.6	27.0	....	....	....	....	....	....	....	....	.....
189544	.....	.....	....	33.5	....	30.0	34.8	49.8	34.8	....	....	....	....	....	.....
189695	106.0	.....	....	29.0	36.0	27.5	33.5	50.0	34.0	49.5	....	....	....	....	.....
189551	88.0	.....	60?	30.0	30.5	25.0	34.8	50.5	33.2	50.5	....	....	....	....	Inverted gonial angles
189598	.....	.....	....	....	....	....	....	....	....	....	....	....	29.2	43.8	Part of left maxilla

1. Bigonial breadth
2. Bicondylar breadth
3. Height of ascending ramus
4. Minimum breadth of ramus
5. Height of symphysis
6. Height of body

M=Length of molars
MPM=Length of molars and premolars

TABLE III

Cranial Capacities of Three Maya Skulls from San José

Catalogue Numbers	Capacities in cc. Direct Measurement				Capacities Calculated by Formulae		
	1st Exp.	2nd Exp.	3rd Exp.	Average	(1) .000337×H.L.B. +406.01	(2) .0003849×H.L.B. ±65/$\sqrt{N}$	(3) .000366 H'.L.B.+ 198.9±45.8/$\sqrt{N}$
189198	1295	1300	1285	1293	1300 cc.	1119±37.52 cc.	1171±26.44 cc.
189562	1280	1250	1285	1272			
189703	1240	1235	1220	1232			

Average capacity of three skulls=1266±9.8 cc., by direct measurement, and the calculated capacity (Pearson's formula) was 1300 cc. For discussion of the slight difference between H and H' see G. von Bonin (Jour. Comp. Neurology, vol. 59, 1934, p. 11).

TABLE IV

I. Skeletal Material from San José (*J. Eric Thompson*)
II. Skeletal Material from Baking Pot (*O. Ricketson*)
III. Measurements on Living Maya of Yucatan (*M. Steggerda*)

	Length	Breadth	100 B/L	Capacity in cc.	Minimum frontal
I	4♂156.0 ±4.91	4♂139.2 ±0.89	3♂87.5 ±2.57	3♂1266± 9.8	3♂ 99.3 ±1.94
II	5♂173.6 ±6.61 5♀163.2 ±5.72	5♂146.0 ±5.71 5♀144.0 ±3.39	5♂84.3 ±2.28 5♀88.4 ±1.71	4♂1375±41.7 5♀1225±52.6	4♂ 98.5 ±1.84 3♀ 93.3 ±2.08
III	77♂180.41±0.41 56♀170.57±0.37	76♂153.71±0.36 55♀148.79±0.39	77♂85.01±0.22 56♀87.11±0.26	....	50♂110.86±0.44 48♀106.54±0.48